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ECONOMICAL USE OF MEAT IN THE HOME



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Owing to its wide range of climate and soil the United States produces the staple foods in great variety and abundance, as well as many of those which are usually termed "luxuries."

The foods used to give variety to the diet vary with time, place, and circumstances, but the staple foods the country over are cereal grains and their products, meat, dairy products, eggs, and the more usual vegetables and fruits. According to the results of a large number of carefully conducted studies in American homes, it appears that meat and poultry supply 16 per cent of the total food material, 30 per cent of the protein, and 59 per cent of the fat in the average American dietary; dairy products, 18 per cent of the total food, 10 per cent of the total protein, 26 per cent of the total fat, and 4 per cent of the total carbohydrates; cereals and their products, 31 per cent of the total food material, 43 per cent of the total protein, 9 per cent of the total fat, and 62 per cent of the total carbohydrates; and vegetables and fruits together, 25 per cent of the total food, 9 per cent of the total protein, 2 per cent of the total fat, and 16 per cent of the total carbohydrates. These figures indicate clearly the relation which the principal agricultural products must of necessity bear to home problems. The utilization of these staple foods to the best advantage is of great importance to every housekeeper.

Many problems connected with the nutritive value of these staple agricultural products, their preparation for the table, digestibility, palatability, and the hygienic and economic aspects of the question have been studied in connection with the nutrition investigations of the States Relations Service. The laboratory work, which has been very extended and which has included experiments with the respiration calorimeter, has yielded results of great practical value as well as of scientific importance. The results of these experimental studies are brought together in this discussion of the economical use of meat in the home.

VALUE OF MEAT AS FOOD.

Considering the fact that meat forms such an important part of the diet and the further fact that the price of meat, as of other foods, has advanced in recent years, it is natural for housekeepers to seek more economical methods of preparing meat for the table, and to turn their thoughts toward the less expensive cuts and ask what economy is involved in their use, how they may be prepared, and whether the less expensive dishes are as nutritious and as thoroughly and easily digested as the costlier ones.

The value of meat as food depends chiefly on the presence of two classes of nutrients, (1) protein or nitrogenous compounds, and (2) fat. The mineral matter it contains, particularly the phosphorus compounds, is also of much importance, though it is small in quantity. Protein is essential for the construction and maintenance of the body and both protein and fat yield energy for muscular power and for keeping up the temperature of the body. Fat is especially important as a source of energy. It is possible to combine the fat and protein of animal foods so as to meet the requirements of the body with such materials only, and this is done in the Arctic regions, where vegetable food is lacking; but in general it is considered that diet is better and more wholesome when, in addition to animal foods, such as meat, which is rich in proteins and fats, it contains vegetable foods, which are richest in sugar,

starch, and other carbohydrates. Both animal and vegetable foods supply the mineral substances which are essential to body growth and development. In meat mineral matter constitutes about 0.3 to 1.9 per cent on an average of the total fresh material.

The composition of the various cuts of meat and similar topics have been discussed in more detail in an earlier bulletin of this series.* The general differences between the various cuts are shown in the following table:

Average composition of edible portion of different cuts of meat.

Kind of meat.	Water.	Protein. ^b	Fat.	Ash.	Fuel value per pound.
	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Calories.</i>
Beef:					
Brisket.....	54.6	15.8	28.5	0.9	1,495
Chuck rib.....	66.8	19.0	13.4	1.0	920
Flank.....	59.3	19.6	21.1	.9	1,255
Sirloin.....	61.9	18.9	18.5	1.0	1,130
Neck.....	66.3	20.7	12.7	1.0	920
Ribs.....	57.0	17.8	24.6	.9	1,370
Round.....	67.8	20.9	10.6	1.1	985
Shank.....	70.3	21.4	8.1	.9	740
Side.....	62.2	18.8	18.8	.9	1,145
Veal: Side, with kidney, fat, and tallow.....	71.3	20.2	8.1	1.0	715
Mutton: Side, without tallow.....	53.6	16.2	29.8	.8	1,560
Lamb: Side, without tallow.....	58.2	17.6	23.1	1.1	1,360
Pork:					
Tenderloin.....	66.5	18.9	13.0	1.0	900
Chops.....	50.7	16.4	32.0	.9	1,655

It will be noted that the difference between the cuts is chiefly in the amount of the fat and consequently in the fuel value. So far as the proteins are concerned, i. e., the substances which build and repair the important tissues of the body, very little difference is found in the items included in the table, and the range is not especially significant when the total quantity of meat protein in the ordinary diet is taken into account. For all practical everyday purposes, therefore, it may be considered that the protein obtained from a given weight of meat differs very little either with the kind of meat or the cut. The fattest portions of pork, which are used for salt pork or cured pork and bacon, are exceptions, and in such cuts the proteins may be as low as 8 or 9 per cent.

This general uniformity in proportion of protein makes it easy for the housekeeper who does not wish to enter into the complexities of food values to make sure that her family is getting enough of this nutrient. From the investigations carried on in the States Relations Service the conclusion has been drawn that of the total amount of protein needed every day, which is usually estimated to be 100 grams or 3½ ounces,^c one-half or 50 grams is taken in the form of animal food, which of course includes milk, eggs, poultry, fish, etc., as well as meat. The remainder is taken in the form of bread and other cereal foods and beans and other vegetables. The portion of cooked meat which may be referred to as an ordinary "helping," 3 to 5 ounces (equivalent to 3½ to 5½ ounces of raw meat), may be considered to contain some 19 to 29 grams of protein, or approximately half of the amount which is ordinarily secured from animal food. An egg or a glass of milk contains about 8 grams more, so the housekeeper who gives each adult member of her family a helping of meat each day and eggs, milk, or cheese, together with the puddings or other dishes which contain eggs and milk, can feel sure that she is supplying sufficient protein, for the remainder necessary will be supplied by bread, cereals, and other vegetable food.

The food value of any material of course depends upon the amount of its nutrients which the digestive organs can make available for the use of the body as well as upon its chemical composition; hence digestibility must be considered

* U. S. Dept. Agr., Farmers' Bul. 34.

^b Protein estimated by factor, i. e., total nitrogen multiplied by 6.25.

^c One ounce equals 28 grams.

in comparing different kinds of food. The question whether the cheaper cuts prepared by the longer method are as thoroughly and as easily digested as the better cuts broiled or roasted has been satisfactorily answered by work which has been done as part of the nutrition investigations of the States Relations Service.^a The results obtained show that, so far at least as present knowledge is concerned, there is practically no difference between the various cuts of meat or the meats from different animals with respect to either the thoroughness or the ease with which they are digested. Over 95 per cent of the protein and of the fat of all kinds and cuts of meat is digested by the body under normal conditions, which means that meat is a very thoroughly assimilated food and that there are no marked differences in the thoroughness with which different sorts are digested. The experimenters say: "It is commonly said that meats of different sorts vary decidedly in digestibility; for instance, that red meat is less digestible than white meat, or pork than beef, or that a cheaper cut is less digestible than a tender steak. As regards the thoroughness of digestion, the results of the extended series of tests reported show that such differences do not exist in any appreciable degree and that meat of all kinds and cuts is to be classed with the very digestible foods." Therefore, those who wish to use the cheaper cuts need not feel that in so doing their families are less well nourished than by the more expensive meats.

PROPORTION OF DIFFERENT CUTS AND THEIR RELATION TO MEAT PRICES.

The price which the producer receives for the animal he has fattened for market must of necessity be a determining factor in fixing the price of meat which the consumer pays. The producer's price varies with a variety of conditions, including the cost of grain used in feeding animals, the rates of transportation, and other factors. The animal is usually marketed by the producer at so much a pound on the basis of live weight or of dressed weight. From the results of a large number of experimental tests at the agricultural experiment stations and data recorded by abattoirs and packing houses, the relation of dressed to live weight has been ascertained, the dressed weight in the case of beef animals being on an average 60 to 65 per cent of the live weight. The number and kind of cuts into which the dressed carcass is divided vary somewhat in different markets, though there is a greater tendency to uniformity in the United States than was once the case. In general, the cuts correspond to the anatomical structure of the animal and to the character of the muscular tissue.

The agricultural experiment stations in Iowa, Kansas, Minnesota, Illinois, and most of the other States have studied a variety of problems connected with the production of farm animals for market and have contributed much data of interest in connection with such problems. On the basis of investigations like those referred to, it has been found that on an average in the case of beef animals the ribs constitute 9 per cent of the total dressed weight, the loins 19 per cent, the chucks (with shoulder, neck, and brisket) 27 per cent, the plates 13 per cent, the shanks 3 per cent, the rounds (including rump) 23 per cent, the flanks 3 per cent, and the suet 3 per cent.

The muscular tissue which has been most concerned in the muscular work which the animal has performed is less tender than that which has been less used and differences in flavor are also influenced by similar causes. It naturally follows, therefore, that the different cuts of meat are not considered equally desirable; consequently, when cut up by the market man, the different cuts sell for a variety of prices.

In commercial transactions some percentage of advance in the selling over the buying price must be expected if the dealer is to be successful, and such factors as the cost of handling, storing, marketing, and possible deterioration during

^a U. S. Dept. Agr., Office of Expt. Stas. Buls. 141, 162, and 193.

storage must be taken into account. The relation of such factors to particular cases is of fundamental importance in understanding commercial transactions.

The simplest method of fixing market prices would doubtless be to determine upon a reasonable percentage of increase which would be the same for all cuts. Such a custom has been followed in many localities. For instance, it was at one time the common practice in markets in Cuba and Mexico, particularly in small towns, to sell the whole carcass at a uniform price per pound, a custom still followed, but which does not long survive in a locality much influenced by outside conditions. In the United States, as every one knows, the price varies with the kind of meat and with the cut.

When the wholesale dealer buys meat from the producer he pays a certain uniform price per pound for the carcass on the basis of either live or dressed weight. In determining upon the advance over cost price, which is to be his selling price, it is customary to take into account the fact that the carcass is made up of a number of cuts and that some of them are considered more desirable than others and will therefore sell for a higher price. So it is a common custom to assume that the more desirable cuts have cost a higher price and that the less sought after cuts have cost a lower price than the uniform price which was actually paid per pound for the carcass. In other words, the wholesaler distributes his original total cost in a manner convenient from a commercial standpoint for making selling prices. Thus, as an illustration, if the carcass which was purchased at a uniform price of 10 cents per pound be assumed to supply 10 pounds of some choice cut and 10 pounds of some cheaper cut, the assumption might be made that the choice cut cost 15 cents per pound and the cheaper cut 5 cents per pound, without changing the total sum paid for both at the assumed uniform purchase price.

The table following, which is based upon a considerable amount of data collected in connection with Department of Agriculture work, summarizes information of this sort and shows the estimated cost to the wholesaler of the different cuts of beef when the carcass is purchased dressed at a uniform price ranging from $4\frac{1}{2}$ to 8 cents per pound. In distributing the total cost the weight of the different cuts is of course taken into account.

Estimated cost to the wholesaler of different cuts when the carcass is purchased at certain prices per pound, dressed weight.

Assumed sale price per pound of carcass.	Estimated cost of cut.							
	Ribs.	Loins.	Chucks.	Plates.	Shanks.	Rounds.	Flanks.	Suet.
Cents.	Cents.	Cents.	Cents.	Cents.	Cents.	Cents.	Cents.	Cents.
$4\frac{1}{2}$	7	8	$3\frac{1}{2}$	$2\frac{1}{2}$	2	$4\frac{1}{2}$	3	3
5	$7\frac{1}{2}$	9	4	3	2	5	3	3
$5\frac{1}{2}$	$7\frac{3}{4}$	$9\frac{1}{2}$	4	$3\frac{1}{2}$	2	5	3	3
$5\frac{3}{4}$	8	10	4	$3\frac{3}{4}$	2	5	3	3
$5\frac{1}{2}$	$8\frac{1}{2}$	$10\frac{1}{2}$	$4\frac{1}{2}$	$3\frac{1}{2}$	2	$5\frac{1}{2}$	3	3
6	9	11	$4\frac{3}{4}$	$3\frac{3}{4}$	2	$5\frac{3}{4}$	3	3
$6\frac{1}{2}$	$9\frac{1}{2}$	12	$4\frac{1}{2}$	$3\frac{1}{2}$	2	$5\frac{1}{2}$	3	3
$6\frac{3}{4}$	10	$12\frac{1}{2}$	$4\frac{3}{4}$	$3\frac{1}{2}$	2	$5\frac{3}{4}$	3	3
7	11	14	5	$3\frac{1}{2}$	2	$5\frac{1}{2}$	3	3
$7\frac{1}{2}$	$12\frac{1}{2}$	15	$5\frac{1}{2}$	$3\frac{3}{4}$	$2\frac{1}{2}$	6	3	3
8	14	16	$5\frac{3}{4}$	4	3	$6\frac{1}{2}$	4	4

It is upon such data as the above table presents that the retail prices of meat are based theoretically, though of course many other factors, which vary with circumstances, must also be taken into account.

APPARENT AND ACTUAL COST OF MEAT IN DIFFERENT CUTS.

The relative retail prices of the various cuts usually bear a direct relation to the favor with which they are regarded by the majority of persons, the juicy tender cuts of good flavor selling for the higher prices. When porter-house steak sells for 25 cents a pound, it may be assumed that in town or village markets round steak would ordinarily sell for about 15 cents, and chuck

ribs, one of the best cuts of the forequarter, for 10 cents. This makes it appear that the chuck ribs are less than half as expensive as porterhouse steak and two-thirds as expensive as the round. But apparent economy is not always real economy, and in this case the bones in the three cuts should be taken into account. Of the chuck ribs, more than one-half is bone or other materials usually classed under the head of "waste" or "refuse." Of the round, one-twelfth is waste, and of the porterhouse one-eighth. In buying the chuck, then, the housewife gets, at the prices assumed, less than one-half pound of food for 10 cents, making the net price of the edible portion 22 cents a pound; in buying round, she gets eleven-twelfths of a pound for 15 cents, making the net value about 16½ cents; in buying porterhouse, she gets seven-eighths of a pound for 25 cents, making the net value about 23½ cents a pound. The relative prices, therefore, of the edible portions are 22, 16½, and 23½ cents; or to put it in a different way, a dollar at the prices assumed will buy 4½ pounds of solid meat from the cut, known as chuck, 6 pounds of such meat from the round, and only 3½ pounds of such meat from the porterhouse. To this should be added the fact that because of the way in which porterhouse is usually cooked no nutriment is obtained from the bone, while by the long slow process by which the cheaper cuts, except when they are broiled or fried, are prepared the gelatin, fat, and flavoring material of the bone are extracted. The bones of meats that are cooked in water, therefore, are in a sense not all refuse, for they contain some food which may be secured by proper cookery.

It is true, of course, that the bones of the steaks may be used for soup making, and that the nourishment may thus be utilized, but this must be done by a separate process from that of cooking the steak itself.

The facts discussed above are shown for a larger number of kinds of meat in the following table, which gives the proportion of bone and edible material in a number of cuts, together with the net price as compared with an assumed original price. As the cost of meat varies in different regions, in different markets, and at different times, it is impossible to give values which will represent a fair average market price. Those included in the table are simply selected to illustrate the point under consideration.

Net cost of edible portion of different cuts as compared with assumed market price^a per pound.

Kind of meat.	Proportion of bone or waste in cut.	Proportion of edible material in cut.	Assumed market price per pound.	Net price per pound of edible portion.
Beef:	<i>Per cent.</i>	<i>Per cent.</i>	<i>Cents.</i>	<i>Cents.</i>
Brisket.....	23.3	76.7	7.0	9.0
Rump.....	19.0	81.0	10.0	12.5
Flank.....	5.5	94.5	7.0	7.5
Chuck rib.....	19.1	80.9	10.0	12.4
Porterhouse.....	12.7	87.3	20.0	23.0
Neck.....	31.2	68.8	7.0	10.0
Ribs.....	20.1	79.9	15.0	19.0
Round.....	8.5	91.5	15.0	16.5
Shin.....	38.3	61.7	3.0	5.0
Heart.....	5.9	94.1	5.0	5.5
Tongue.....	26.5	73.5	22.0	30.0
Veal:				
Cutlets.....	3.4	96.6	20.0	21.0
Breast.....	24.5	75.5	12.5	17.0
Mutton:				
Leg.....	17.7	82.3	15.0	18.0
Chops.....	14.8	85.2	15.0	17.5
Forequarter cut for stewing.....	21.2	78.8	12.5	15.9
Pork:				
Loin.....	19.3	80.7	15.0	19.0
Salt pork.....	8.1	91.9	12.5	13.5
Bacon.....	8.7	91.3	20.0	22.0
Ham.....	12.2	87.8	20.0	23.0

^a Prices vary greatly at different times and in different parts of the country. These prices were assumed for the purpose of making it possible to compare nominal with net prices.

TEXTURE AND FLAVOR OF MEAT.

Although meats vary greatly in the amount of fat which they contain and to a much less degree in their protein content, the chief difference to be noted between the cheaper and more expensive cuts is not so much in their nutritive value as in their texture and flavor. All muscle consists of tiny fibers which under the microscope are seen to have the form of tubes. These fibers are tender in young animals and in those parts of older animals in which there has been little muscular strain. Under the backbone in the hind quarter is the place from which the tenderest meat comes. This is usually called the tenderloin. Sometimes in beef and also in pork it is taken out whole and sometimes it is left to be cut up with the rest of the loin. In old animals, and in those parts of the body where there has been much muscular action, the neck and the legs for example, the muscle fibers are tough and hard. But there is another point which is of even greater importance than this. The fibers of all muscle are bound together in bundles and in groups of bundles by a thin membrane which is known as connective tissue. This membrane if heated in water or steam is converted into gelatin. The process goes quickly if the meat is young and tender; more slowly if it is tough. Connective tissue is also soluble in acetic acid, that acid to which the sourness of vinegar is due. For this reason it is possible to make meat more tender by soaking it in vinegar or in vinegar and water, the proportions of the two depending on the strength of the vinegar. Sour beef or "sauer fleisch," as it is known to Germans, is a palatable dish of this sort for which the recipe is given elsewhere. (See p. 21.) Since vinegar is a preservative this suggests a method by which a surplus of beef may be kept for several days and then converted into a palatable dish.

In a study of factors which influence tenderness, Lehmann* and his associates measured experimentally the relative tenderness of raw meat of different kinds and cuts from old and young animals, the effect of hanging and freezing upon tenderness, and also the effects of cooking. According to his summary, the toughness or tenderness of the individual meat fibers is a matter of the location of the cut, and his measurements showed that the raw fibers from an exterior cut (flank) were almost two and a half times as tough as those from an interior cut (tenderloin).

In the case of veal, the two sorts of cuts showed the same general differences as beef, but in a greater degree. The muscle fibers of mutton and pork, according to the experimental data which Lehmann cites, were in general more tender than beef.

Flavor in meat depends mainly on certain nitrogenous substances which are called extractives because they can be dissolved out or "extracted" by soaking the meat in cold water. The quality of the extractives and the resulting flavor of the meat vary with the condition of the animal and in different parts of its body. They are usually considered better developed in older than in very young animals. Many persons suppose extractives or the flavor they cause are best in the most expensive cuts of meat; in reality, cuts on the side of beef are often of better flavor than tender cuts, but owing to the difficulty of mastication this fact is frequently not detected. The extractives have little or no nutritive value in themselves, but they are of great importance in causing the secretion of digestive juices at the proper time, in the right amount, and of the right chemical character. The digestive tract may be likened to a piece of machinery which is beautifully built and adjusted and is ready to run and turn out its product as soon as a lever is moved which sets it in motion. The flavoring bodies of food, and especially those contained in meat, can be likened to the lever which sets the machinery in motion. Excitants to normal digestion are supplied by other foods as well, but meats, so physiologists believe, are especially important for the purpose. It is this quality which

* Arch. Hyg., 63 (1907), p. 134.

justifies the taking of soup at the beginning of a meal and the giving of broths, meat extracts, and similar preparations to invalids and weak persons. These foods have little nutritive material in themselves, but they are great aids to the digestion of other foods.

The amount of the extractives which will be brought out into the water when meat is boiled depends upon the size of the pieces into which the meat is cut and on the length of time they are soaked in cold water before being heated. A good way to hinder the escape of the flavoring matter is to sear the surface of the meat quickly by heating it in fat, or the same end may be attained by plunging it into boiling water. Such facts are known to all cooks and have recently been studied systematically at the Illinois Experiment Station in relation to the amounts removed and the losses which may be involved in different methods of cookery. Such solubility is taken advantage of in making beef tea at home and in the manufacture of meat extract, the extracted material being finally concentrated by evaporating the water.

GENERAL METHODS OF PREPARING MEAT FOR THE TABLE.

The advantages of variety in the methods of preparing and serving are to be considered even more seriously in the cooking of the cheaper cuts than in the cooking of the more expensive ones, and yet even in this connection it is a mistake to lose sight of the fact that, though there is a great variety of dishes, the processes involved are few in number.

An experienced teacher of cooking, a woman who has made very valuable contributions to the art of cookery by showing that most of the numerous processes outlined and elaborately described in the cook books can be classified under a very few heads, says that she tries "to reduce the cooking of meat to its lowest terms and teach only three ways of cooking. The first is the application of intense heat to keep in the juices. This is suitable only for portions of clear meat where the fibers are tender. By the second method the meats are put in cold water and cooked at a low temperature. This is suitable for bone, gristle, and the toughest portions of the meat, which for this purpose should be divided into small bits. The third is a combination of these two processes and consists of searing and then stewing the meat. This is suitable for half-way cuts, i. e., those that are neither tender nor very tough." The many varieties of meat dishes are usually only a matter of flavor and garnish.

In other words, of the three processes the first is the short method; it aims to keep all the juices within the meat. The second is a very long method employed for the purpose of getting all or most of the juices out. The third is a combination of the two not so long as the second and yet requiring so much time that there is danger of the meat being rendered tasteless unless certain precautions are taken such as searing in hot fat or plunging into boiling water.

It is commonly said that the cooked meat fibers are harder or less tender than the raw, which seems a natural assumption since the meat protein, like egg albumen, is coagulated by heat, and furthermore, the water is forced out from the individual muscle fibers and they are shortened and thickened by the application of heat. Apparently, however, such general deductions must be modified on the basis of the experimental data obtained in Lehmann's^a laboratory, for he found marked differences in this respect between the interior cuts of beef, of which tenderloin is a typical example, and exterior cuts such as flank. When beef flank was cooked by boiling for two hours, the toughness of the fibers greatly increased during the first half hour of the cooking period, and then diminished so that at the end of the cooking period the meat was found to be in about the same condition with respect to toughness or tenderness of the fibers as at the beginning. On the other hand, in the case of the tenderloin, there was a decrease in toughness of the fibers throughout the cooking period which was

^a Arch. Hyg., 63 (1907), p. 134.

particularly marked in the first few minutes of cooking, and at the end of the cooking period the meat fibers were only half as tough as before cooking.

A good idea of the changes which take place while meat is being cooked can be obtained by examining a piece of flesh which has been "cooked to pieces," as the saying goes. In this the muscular fibers may be seen completely separated one from another, showing that the connective tissue has been destroyed. It is also evident that the fibers themselves are of different texture from those in the raw meat. In preparing meat for the table it is usual to stop short of the point of disintegration, but while the long process of cooking is going on the connective tissue is gradually softening and the fibers are gradually changing in texture. The former is the thing to be especially desired, but the latter is not. For this reason it is necessary to keep the temperature below the boiling point and as low as is consistent with thorough cooking, for cooks seem agreed, as the result of experience shows, that slow gentle cooking results in better texture than is the case when meat is boiled rapidly. This is the philosophy that lies back of the simmering process.

When meat is cooked by roasting, broiling, or any other similar process the meat juices brown with the fat, producing substances which to most of us are agreeable to the senses of smell and taste alike. When meats are cooked in hot water such highly flavored substances are not so evident to the sense of smell, but nevertheless bodies of agreeable flavor which are perceptible to the palate are developed in the meat during the cooking process.

The question of the amount and character of the ingredients which escape from the meat and other changes occurring in it during cooking is too complicated to be discussed in detail here. Much careful experimenting along these lines has been done in experiment station and other laboratories,^a and the results show that the losses vary considerably with the method of cooking employed, being of course greatest where small pieces of meat are subjected to prolonged cooking.

Among the principal conclusions drawn from the experiments referred to are the following: The chief loss in weight when meat is cooked is due to the driving off of water. When beef is cooked by pan broiling—that is, searing in a hot, greased pan, a common cooking process—no great loss of nutrition results, particularly if the fat and other substances adhering to the pan are utilized in the preparation of gravy. When beef is cooked by boiling, there is a loss of 3 to 20 per cent of material present, though this is not an actual loss if the broth is utilized for soup or in some similar way. Even in the case of meat which is used for the preparation of beef tea or broth, the losses of nutritive material are apparently small though much of the flavoring matter has been removed. The amount of fat found in broth varies directly with the amount originally present in the meat; the fatter the meat the greater the quantity of fat in the broth. The loss of water in cooking varies inversely with the fatness of the meat; that is, the fatter the meat the smaller the shrinkage due to loss of water. In cooked meat the loss of various constituents is inversely proportional to the size of the cut. In other words, the smaller the piece of meat the greater the percentage of loss. Loss also appears to be dependent somewhat upon the length of time the cooking is continued. When pieces of meat weighing 1½ to 5 pounds are cooked in water somewhat under the boiling point there appears to be little difference in the amount of material found in broth whether the meat is placed in cold water or hot water at the beginning of the cooking period. When meat is roasted in the oven the amount of material removed is somewhat affected by the character of the roasting pan and similar factors, thus the total loss in weight is naturally greater in an open than in a closed pan as the open pan offers more opportunity for the evaporation of water. Judging from the average results of a considerable number of tests it appears that a roast weighing 6 pounds raw should weigh 5 pounds

^a U. S. Dept. Agr., Farmers' Buls. 34, 162, p. 9, and 193, p. 29; also Office of Expt. Stas. Bul. 141.

after cooking, or in other words the loss is about one-sixth of the original weight. This means that if the raw meat costs 20 cents per pound the cooked would represent an increase of 4 cents a pound on the original cost; but this increase would of course be lessened if all the drippings and gravy are utilized. With the quantities used in the ordinary home the relative losses sustained in different methods of cooking meat are not great enough to be of particular importance with reference to economical management. However, in public institutions where a small saving per day for each inmate represents a large item in the course of a year, it may be desirable to select methods involving the least loss, which would mean that the advantage would lie with stewing and boiling rather than with broiling and roasting, so far as the relative losses of material are concerned. The relative economy of different methods of cookery depends very greatly upon the kind of fuel, the form of stove and oven, and other similar factors. These vary so much under different home conditions that it is difficult to draw general deductions though the subject has often been investigated. However, it may be said that is often possible to effect a saving if the housewife can so plan the cooking of meat and other foods as to take full advantage of the heat supplied by the fuel used.

REDUCING THE EXPENSE FOR MEAT IN THE DIET.

The expense for meat in the home may be reduced in several ways, and each housekeeper can best judge which to use in her own case. From a careful consideration of the subject it appears that the various suggestions which have been made on the subject may be grouped under the following general heads: Economy in selection and purchase so as to take advantage of varying market conditions; purchasing meat in wholesale quantities for home use; serving smaller portions of meat than usual or using meat less frequently; careful attention to the use of meat, bone, fat, and small portions commonly trimmed off and thrown away and the utilization of left-over portions of cooked meat; and the use of the less expensive kinds.

The choice of cuts should correspond to the needs of the family and the preferences of its members. Careful consideration of market conditions is also useful not only to make sure that the meat is handled and marketed in a sanitary way but also to take advantage of any favorable change in price which may be due, for instance, to a large local supply of some particular kind or cut of meat. In towns where there is opportunity for choice, it may sometimes be found more satisfactory not to give all the family trade to one butcher; by going to various markets before buying the housekeeper is in a better position to hear of variations in prices and so be in a position to get the best values. Ordering by telephone or from the butcher's boy at the door may be less economical than going to market in person as the range of choice and prices is of course more obvious when the purchaser sees the goods and has a chance to observe market conditions. Each housekeeper must decide for herself whether or not the greater convenience compensates for the smaller range of choice which such ordering from description entails. No matter what the cut, whether expensive or cheap, it can not be utilized to the best advantage unless it is well cooked. Poorly prepared meat dishes are almost inevitably wasted at the table. As an illustration of the losses arising through unwise selection and poor cooking may be mentioned facts observed in dietary studies carried on by the States Relations Service. In many families where the income was fairly good the table and other conditions were far from satisfactory. In such cases the marketing was quite commonly done by a child or someone without knowledge or experience. In a particular instance the selection was expensive steak, which later was so badly cooked that it was hardly possible to eat it. A cheaper cut well cooked would have been much more satisfactory as well as more economical.

There is sometimes an advantage in using canned meat and meat products, and, if they are of good quality, such products are wholesome and palatable.

That economy is furthered by careful serving at table is obvious. If more meat is given at each serving than the person wishes or habitually eats the table waste is unduly increased. Economy in all such points is important and not beneath the dignity of the family.

In rural regions both in the United States and in Europe farmers sometimes cooperate in the maintenance of slaughterhouses and storehouses, thus making it easier to obtain fresh meat in hot weather. In a "meat club"^a in this country, which was said to be successful, the members took turns in providing animals (lambs or heifers) for the slaughtering which was done in a special shed on three Saturdays of each month. The meat was distributed among the members according to a system previously agreed on, the different cuts going to the different members in rotation. A fixed price per pound was agreed on at the beginning of the season and at the end of the season accounts were balanced according to the weight of the animals provided by and of the cuts supplied to each member. Such a plan seems capable of extension to meet a variety of conditions, particularly in rural regions.

Various other phases of the question of lessening the expense for meat in the home are discussed in the following sections.

LESSENING THE AMOUNT OF MEAT USED.

In many American families meat is eaten two or three times a day; in such cases the simplest way of reducing the meat bill would very likely be to cut down the amount used, either by serving it less often or by using less at a time. Deficiency of protein need not be feared when one good meat dish a day is served, especially if such nitrogenous materials as eggs, milk, cheese, and beans are used instead. In localities where fish can be obtained fresh and cheap, it might well be more frequently substituted for meat for the sake of variety as well as economy. Ingenious cooks have many ways of "extending the flavor" of meat, that is, of combining a small quantity with other materials to make a large dish, as in meat pies, stews, and similar dishes. Such dishes and their preparation are spoken of elsewhere. (See p. 14.)

BUYING MEAT IN QUANTITY FOR HOME USE.

By buying in large quantities under certain conditions it may be possible to procure meat at better prices than those which ordinarily prevail in the retail market. The whole side or quarter of an animal can frequently be obtained at noticeably less cost per pound than when it is bought cut by cut, and can be used to advantage when the housekeeper understands the art and has proper storage facilities and a good-sized family. When a hind quarter of mutton, for example, comes from the market the flank (on which the meat is thin and, as good housekeepers believe, likely to spoil more easily than some other cuts) should be cooked immediately, or if preferred it may be covered with a thin layer of fat (rendered suet) which can be easily removed when the time for cooking comes. The flank, together with the rib bone, ordinarily makes a gallon of good Scotch broth. The remainder of the hind quarter may be used for roast or chops. The whole pig carcass has always been used by families living on the farms where the animals are slaughtered, and in village homes; town housekeepers not infrequently buy pigs whole and "put down" the meat. An animal 6 months old and weighing about 100 pounds would be suitable for this purpose. The hams and thin pieces of belly meat may be pickled and smoked. The thick pieces of belly meat, packed in a two-gallon jar and covered with salt or brine, will make a supply of fat pork to cook with beans and other vegetables. The tenderloin makes good roasts, the head and feet may go into head cheese or scrapple, and the trimmings and other scraps of lean meat serve for a few pounds of homemade sausage. In some large families it is found profitable to "corn" a fore quarter of beef for spring and summer

^a Breeder's Gaz., 53 (1908), p. 232.

use. Formerly it was a common farm practice to dry beef, but now it seems to be more usual to purchase beef which has been dried in large establishments. The general use of refrigerators and ice chests in homes at the present time has had a great influence on the length of time meat may be kept and so upon the amount a housewife may buy at a time with advantage.

Pickling, smoking, and other methods of curing meat for home use has been discussed in an earlier bulletin^a in this series.

The preservation of meat and meat products by canning is a matter of great importance, but it is almost wholly a commercial enterprise, as the difficulties in the way of successfully canning meat in the home are many.

UTILIZING THE FAT, BONE, AND TRIMMINGS IN MEATS, AND THE LEFT-OVER COLD MEATS.

In the percentage of fat present in different kinds and cuts of meat, a greater difference exists than in the percentage of proteids. The lowest percentage of fat shown in the table on page 6 was 8.1 per cent in the shank of beef; the highest was 32 per cent in the pork chops. The highest priced cuts, loin and ribs of beef, contain 20 to 25 per cent. If the fat of the meat is not eaten at the table, and is not utilized otherwise, a pecuniary loss results. If butter is the fat used in making crusts for meat pies, and in preparing the cheaper cuts, there is little economy involved; the fats from other meat should therefore be saved, as they may be used in place of butter in such cases, as well as in preparing many other foods. The fat from sausage or from the soup kettle, or from a pot roast, which is savory because it has been cooked with vegetables, is particularly acceptable. Sometimes savory vegetables, onion, or sweet herbs are added to fat when it is tried out to give it flavor.

Some illustrations of methods of preparing such cooking fats follow:

Trying out Fat.

A double boiler is the best utensil to use in trying out small portions of fat. There is no danger of burning the fat and the odor is much less noticeable than if it is heated in a dish set directly over the fire.

Clarifying Fat.

Excepting where the purpose of clarifying fat is to remove flavors, a good method to follow is to pour boiling water over the fat, to boil thoroughly, and then to set it away to cool. The cold fat may be removed in a solid cake and any impurities clinging to it may be scraped off, as they will be found at the bottom of the layer. By repeating this process two or three times a cake of clean, white fat may be obtained.

A slight burned taste or similar objectionable flavors often can be removed from fat by means of potatoes. After melting the fat, put into it thick slices of raw potato; heat gradually. When the fat ceases to bubble and the potatoes are brown, strain through a cloth placed in a wire strainer.

Savory Drippings.

When rendering the drippings of fat meat, add a small onion (do not cut it), a few leaves of summer savory and thyme, a teaspoonful of salt, and a little pepper. This is enough for a pint of fat. Keep the drippings covered and in a cool place.

Uses for Bones.

Almost any meat bones can be used in soup making, and if the meat is not all removed from them the soup is better. But some bones, especially the rib bones, if they have a little meat left on them, can be grilled or roasted into very palatable dishes. The "sparerib" of southern cooks is made of the rib bones from a roast of pork, and makes a favorite dish when well browned. The braised ribs of beef often served in high-class restaurants are made from the bones cut from rib roasts. In this connection it may be noted that many of the dishes popular in good hotels are made of portions of meat such as are frequently thrown away in private houses, but which with proper cooking and seasoning make attractive dishes and give most acceptable variety to the menu. An old recipe for "broiled bones" directs that the bones (beef ribs or sirloin bones on

^a U. S. Dept. Agr., Farmers' Bul. 183.

which the meat is not left too thick in any part) be sprinkled with salt and pepper (Cayenne), and broiled over a clear fire until browned. Another example of the use of bones is boiled marrow bone. The bones are cut in convenient lengths, the ends covered with a little piece of dough over which a floured cloth is tied, and cooked in boiling water for two hours. After removing the cloth and dough, the bones are placed upright on toast and served. Prepared as above, the bones may also be baked in a deep dish. Marrow is sometimes removed from bones after cooking, seasoned, and served on toast.

Trimnings from meat may be utilized in various "made dishes," of which examples will be given further on, or they can always be put to good use in the soup kettle. It is surprising how many economies may be practiced in such ways and also in the table use of left-over portions of cooked meat if attention is given to the matter. Many of the recipes given in this bulletin involve the use of such left-overs. Others will suggest themselves or may be found in all the usual cookery books.

METHODS OF EXTENDING THE FLAVOR OF MEAT.

Common household methods of extending the meat flavor through a considerable quantity of material which would otherwise be lacking in distinctive taste are to serve the meat with dumplings, generally in the dish with it, to combine the meat with crusts, as in meat pies or meat rolls, or to serve the meat on toast and biscuits. Borders of rice, hominy, or mashed potatoes are examples of the same principles applied in different ways. By serving some preparation of flour, rice, hominy, or other food rich in starch with the meat we get a dish which in itself approaches nearer to the balanced ration than meat alone and one in which the meat flavor is extended through a large amount of the material.

Throughout the bulletin the measurements given in the recipes call for a level spoonful or a level cupful, as the case may be.

USE OF DUMPLINGS AND SIMILAR PREPARATIONS.

A number of recipes for meat dishes made with dumplings and similar preparations follow:

Meat Stew with Dumplings.

STEW.

- | | |
|---|-------------------------------|
| 5 pounds of a cheaper cut of beef. | $\frac{1}{2}$ onion, chopped. |
| 4 cups of potatoes cut into small pieces. | $\frac{1}{4}$ cup of flour. |
| $\frac{3}{4}$ cup each of turnips and carrots cut into $\frac{1}{2}$ -inch cubes. | Salt and pepper. |

Cut the meat into small pieces, removing the fat; try out the fat and brown the meat in it. When well browned, cover with boiling water, boil for five minutes and then cook in a lower temperature until the meat is done. If tender, this will require about three hours on the stove or five hours in the fireless cooker. Add carrots, turnips, onions, pepper, and salt during the last hour of cooking, and the potatoes fifteen minutes before serving. Thicken with the flour diluted with cold water. Serve with dumplings (see below). If this dish is made in the fireless cooker, the mixture must be reheated when the vegetables are put in. Such a stew may also be made of mutton. If veal or pork is used the vegetables may be omitted or simply a little onion used. Sometimes for variety the browning of the meat is dispensed with. When white meat, such as chicken, veal, or fresh pork, is used, the gravy is often made rich with cream or milk thickened with flour. The numerous minor additions which may be introduced give the great variety of such stews found in cookbooks.

DUMPLINGS.

- | | |
|--|---------------------------------|
| 2 cups flour. | $\frac{1}{2}$ teaspoonful salt. |
| 4 teaspoonfuls baking powder. | 2 teaspoonfuls butter. |
| $\frac{1}{2}$ cup milk or a little more if needed. | |

Mix and sift the dry ingredients. Work in the butter with the tips of fingers, add milk gradually, roll out to a thickness of one-half inch and cut with biscuit cutter. In some countries it is customary to season the dumplings themselves with herbs, etc., or to stuff them with bread crumbs fried in butter instead of depending upon the gravy to season them.

A good way to cook dumplings is to put them in a buttered steamer over a kettle of hot water. They should cook from twelve to fifteen minutes. If it is necessary to cook them with the stew, enough liquid should be removed so that they may be placed upon the meat and vegetables.

Sometimes the dough is baked and served as biscuits over which the stew is poured. If the stew is made with chicken or veal it is generally termed a fricassee.

Ragout of Mutton with Farina Balls.

1½ pounds neck of mutton cut into small pieces.	2 cups hot water.
1 tablespoonful butter.	1 teaspoonful salt.
1 tablespoonful flour.	½ teaspoonful pepper.
1 onion.	1 bay leaf.
1 carrot.	Sprig parsley.
½ can peas.	1 clove.

FARINA BALLS.

½ cup farina.	½ teaspoonful pepper.
1 cup milk.	Onion juice.
½ teaspoonful salt.	Yolk 1 egg.

Put butter in frying pan. When melted add flour and brown. Add carrot and onion, cut in dice. Remove vegetables and add meat, searing well. To meat and vegetables add hot water and seasonings. Put in a suitable kettle, cover and simmer two hours. Add peas ten minutes before serving in a dish with farina balls made as follows:

Cook farina and milk in double boiler one hour. Add seasoning and well-beaten yolk. Stir well and cool. When cold roll into balls. Dip in egg and crumbs and fry in deep fat. Rice may be used in a similar way.

MEAT PIES AND SIMILAR DISHES.

Meat pies represent another method of combining flour with meat. They are ordinarily baked in a fairly deep dish the sides of which may or may not be lined with dough. The cooked meat, cut into small pieces, is put into the dish, sometimes with small pieces of vegetables, a gravy is poured over the meat, the dish is covered with a layer of dough, and then baked. Most commonly the dough is like that used for soda or cream-of-tartar biscuit, but sometimes shortened pastry dough, such as is made for pies, is used. This is especially the case in the fancy individual dishes usually called patties. Occasionally the pie is covered with a potato crust in which case the meat is put directly into the dish without lining the latter. Stewed beef, veal, and chicken are probably most frequently used in pies, but any kind of meat may be used, or several kinds in combination. Pork pies are favorite dishes in many rural regions, especially at hog-killing time, and when well made are excellent.

If pies are made from raw meat and vegetables longer cooking is needed than otherwise, and in such cases it is well to cover the dish with a plate, cook until the pie is nearly done, then remove the plate, add the crust, and return to the oven until the crust is lightly browned. Many cooks insist on piercing holes in the top crust of a meat pie directly it is taken from the oven.

Twelve O'clock Pie.

This is made with shoulder of mutton, boiled with carrot and onion, then cut up, mixed with potatoes separately boiled and cut up, and put into a baking dish. The crust is made by mixing smoothly mashed potatoes to which a tablespoonful of shortening has been added, with enough flour and water to make them roll out easily. A pie made of a pound of meat will require 5 or 6 small boiled potatoes, a cupful of mashed potatoes, and 8 or 10 tablespoonfuls of flour, and should be baked about twenty minutes in a hot oven. Salt, pepper, and other seasoning, as onion and carrot, may be added to taste. A teaspoonful of baking powder makes the crust lighter.

Meat and Tomato Pie.

This dish presents an excellent way of using up small quantities of either cold beef or cold mutton. If fresh tomatoes are used, peel and slice them; if canned, drain off the liquid. Place a layer of tomato in a baking dish, then a layer of sliced meat, and over the two dredge flour, pepper, and salt; repeat until the dish is nearly full, then put in an extra layer of tomato and cover the whole with a layer of pastry or of bread or cracker crumbs. When the quantity of meat is small, it may be "helped out" by boiled potatoes

or other suitable vegetables. A few oysters or mushrooms improve the flavor, especially when beef is used. The pie will need to be baked from half an hour to an hour according to its size and the heat of the oven.

Meat and Pastry Rolls.

Small quantities of cold ham, chicken, or other meat may be utilized for these. The meat should be chopped fine, well seasoned, mixed with enough savory fat or butter to make it "shape," and formed into rolls about the size of a finger. A short dough (made, say, of a pint of flour, 2 tablespoonfuls of lard, 1 teaspoonful of baking powder, salt, and milk enough to mix) should be rolled thin, cut into strips, and folded about the meat rolls, care being taken to keep the shape regular. The rolls should be baked in a quick oven until they are a delicate brown color and served hot.

Meat Turnovers.

Almost any kind of chopped meat may be used in these, and if the quantity on hand is small may be mixed with potato or cooked rice. This filling should be seasoned to taste with salt and pepper, onion, or whatever is relished, and laid on pieces of short biscuit dough rolled thin and cut into circles about the size of an ordinary saucer. The edges of the dough should be moistened with white of egg, the dough then folded over the meat, and its edges pinched closely together. If desired, the tops of the turnovers may be brushed over with yolk of egg before they are placed in the oven. About half an hour's baking in a hot oven is required. Serving with a brown sauce (see p. 27) increases the flavor and moistens the crust.

MEAT WITH MACARONI AND OTHER STARCHY MATERIALS.

Macaroni cooked with chopped ham, hash made of meat and potatoes or meat and rice, meat croquettes—made of meat and some starchy materials like bread crumbs, cracker dust, or rice—are other familiar examples of meat combined with starchy materials. Pilaf, a dish very common in the Orient and well known in the United States, is of this character and easily made. When there is soup or soup stock on hand it can be well used in the pilaf.

Turkish Pilaf.

$\frac{1}{2}$ cup of rice.

$\frac{3}{4}$ cup of tomatoes stewed and strained.

1 cup stock or broth.

3 tablespoonfuls of butter.

Cook the rice and tomatoes with the stock in a double boiler until the rice is tender, removing the cover after the rice is cooked if there is too much liquid. Add the butter and stir it in with a fork to prevent the rice from being broken. A little catsup or Chili sauce with water enough to make three-quarters of a cup may be substituted for the tomatoes. This may be served as a border with meat, or served separately in the place of a vegetable, or may make the main dish at a meal, as it is savory and reasonably nutritious.

Meat Cakes.

1 pound chopped veal.

$\frac{1}{2}$ pound soaked bread crumbs.

2 tablespoonfuls savory fat or butter.

1 teaspoonful chopped onion.

$1\frac{1}{2}$ teaspoonfuls salt.

Dash of pepper.

Mix all the ingredients except the butter or fat and shape into small round cakes. Melt the fat in a baking pan and brown the cakes in it, first one side and then the other. Either cooked or raw veal may be used. In the case of raw meat the pan should be covered so that the heat may be retained to soften the meat.

Stew from Cold Roast.

This dish provides a good way of using up the remnants of a roast, either of beef or mutton. The meat should be freed from fat, gristle, and bones, cut into small pieces, slightly salted, and put into a kettle with water enough to nearly cover it. It should simmer until almost ready to break in pieces, when onions and raw potatoes, peeled and quartered, should be added. A little soup stock may also be added if available. Cook until the potatoes are done, then thicken the liquor or gravy with flour. The stew may be attractively served on slices of crisp toast.

MEAT WITH BEANS.

Dry beans are very rich in protein, the percentage being fully as large as that in meat. Dry beans and other similar legumes are usually cooked in water, which they absorb, and so are diluted before serving; on the other hand, meats by the ordinary methods of cooking are usually deprived of some of the water originally present—facts which are often overlooked in discussing the matter. Nevertheless, when beans are served with meat the dish is almost as rich in protein as if it consisted entirely of meat.

Pork and beans is such a well-known dish that recipes are not needed. Some cooks use a piece of corned mutton or a piece of corned beef in place of salt or corned pork or bacon or use butter or olive oil in preparing this dish.

In the Southern States, where cowpeas are a common crop, they are cooked in the same way as dried beans. Cowpeas baked with salt pork or bacon make an excellent dish resembling pork and beans, but of distinctive flavor. Cowpeas boiled with ham or with bacon are also well-known and palatable dishes.

Recipes are here given for some less common meat and bean dishes.

Mexican Beef.

The Mexicans have a dish known as "Chili con carne" (meat with Chili pepper), the ingredients for which one would doubtless have difficulty in obtaining except in the southwestern United States. However, a good substitute for it may be made with the foods available in all parts of the country. The Mexican recipe is as follows:

Remove the seeds from two Chili peppers, soak the pods in a pint of warm water until they are soft, scrape the pulp from the skin and add to the water. Cut two pounds of beef into small pieces and brown in butter or drippings. Add a clove of garlic and the Chili water. Cook until the meat is tender, renewing the water if necessary. Thicken the sauce with flour. Serve with Mexican beans either mixed with the meat or used as a border.

In the absence of the Chili peppers, water and Cayenne pepper may be used, and onions may be substituted for garlic. For the Mexican beans, red kidney beans either fresh or canned make a good substitute. If the canned beans are used they should be drained and heated in a little savory fat or butter. The liquid may be added to the meat while it is cooking. If the dried beans are used they should be soaked until soft, then cooked in water until tender and rather dry, a little butter or dripping and salt being used for seasoning or gravy. White or dried Lima beans may be used in a similar way.

Haricot of Mutton.

2 tablespoonfuls of chopped onions.	1½ pounds of lean mutton or lamb cut into
2 tablespoonfuls of butter or drippings.	2-inch pieces.
2 cups of water, and salt and pepper.	

Fry the onions in the butter, add the meat, and brown; cover with water and cook until the meat is tender. Serve with a border of Lima beans, seasoned with salt, pepper, butter, and a little chopped parsley. Fresh, canned, dried, or evaporated Lima beans may be used in making this dish.

Roast Pork with Cowpeas.

For this dish a leg of young pork should be selected. With a sharp knife make a deep cut in the knuckle and fill the opening with sage, pepper, salt, and chopped onion. When the roast is half done scar the skin but do not cut deeper than the outer rind. When the meat is nearly cooked pour off the excess of fat and add a quart of white cowpeas which have been previously parboiled or "hulled" and cook slowly until quite done and the meat is brown. Apple sauce may be served with this dish.

MEAT SALADS.

Whether meat salads are economical or not depends upon the way in which the materials are utilized. If in chicken salad, for example, only the white meat of chickens especially bought for the purpose and only the inside stems of expensive celery are used, it can hardly be cheaper than plain chicken. But, if portions of meat left over from a previous serving are mixed with celery grown at home, they certainly make an economical dish, and one very acceptable to most persons. Cold roast pork or tender veal—in fact, any white meat can be utilized in the same way. Apples cut into cubes may be substituted for part of the celery; many cooks consider that with the apple the salad takes the dressing better than with the celery alone. Many also prefer to marinate (i. e., mix with a little oil and vinegar) the meat and celery or celery and apples before putting in the final dressing, which may be either mayonnaise or a good boiled dressing.

MEAT WITH EGGS.

Occasionally eggs are combined with meat, making very nutritious dishes. Whether this is an economy or not of course depends on the comparative cost of eggs and meat.

In general, it may be said that eggs are cheaper food than meat when a dozen costs less than 1½ pounds of meat, for a dozen eggs weighs about 1½ pounds and

the proportions of protein and fat which they contain are not far different from the proportions of these nutrients in the average cut of meat. When eggs are 30 cents a dozen they compare favorably with round of beef at 20 cents a pound.

Such common dishes as ham and eggs, bacon or salt pork and eggs, and omelette with minced ham or other meat are familiar to all cooks.

Roast Beef with Yorkshire Pudding.

The beef is roasted as usual and the pudding made as follows:

YORKSHIRE PUDDING.

3 eggs.	1 cupful flour.
1 pint milk.	1 teaspoonful salt.

Beat the eggs until very light, then add the milk. Pour the mixture over the flour, add the salt, and beat well. Bake in hissing hot gem pans or in an ordinary baking pan for forty-five minutes, and baste with drippings from the beef. If gem pans are used, they should be placed on a dripping pan to protect the floor of the oven from the fat. Many cooks prefer to bake Yorkshire pudding in the pan with the meat; in this case the roast should be placed on a rack and the pudding batter poured on the pan under it.

Corned-Beef Hash with Poached Eggs.

A dish popular with many persons is corned-beef hash with poached eggs on top of the hash. A slice of toast is sometimes used under the hash. This suggests a way of utilizing the small amount of corned-beef hash which would otherwise be insufficient for a meal.

Housekeepers occasionally use up odd bits of other meat in a similar way, chopping and seasoning them and then warming and serving in individual baking cups with a poached or shirred egg on each.

Ham and Poached Eggs with Cream Sauce.

A more elaborate dish of meat and eggs is made by placing a piece of thinly sliced boiled ham on a round of buttered toast, a poached egg on the ham, and covering with a highly seasoned cream or a Hollandaise sauce. A slice of tongue may be used instead of the ham. If preferred, a well-seasoned and rather thick tomato sauce or curry sauce may be used.

STUFFING OR FORCEMEAT.

Another popular way to extend the flavor of meat over a large amount of food is by the use of stuffing or forcemeat (a synonym more common in England than in the United States). As it is impossible to introduce much stuffing into some pieces of meat even if the meat is cut to make a pocket for it, it is often well to prepare more than can be put into the meat and to cook the remainder in the pan beside the meat. Some cooks cover the extra stuffing with buttered paper while it is cooking and baste it at intervals.

Some recipes for meat dishes of this character follow, and others will be found in cookbooks.

Mock Duck.

Mock duck is made by placing on a round steak a stuffing of bread crumb well seasoned with chopped onions, butter, chopped suet or dripping, salt, pepper, and a little sage, if the flavor is relished. The steak is then rolled around the stuffing and tied with a string in several places. If the steak seems tough, the roll is steamed or stewed until tender before roasting in the oven until brown. Or it may be cooked in a casserole or other covered dish, in which case a cupful or more of water or soup-stock should be poured around the meat. Mock duck is excellent served with currant or other acid jelly.

Mock Wild Duck.

1 flank steak, or
1½ pounds round steak cut $\frac{1}{2}$ inch thick.
2 lamb kidneys.
 $\frac{3}{4}$ cup butter or drippings.
 $\frac{1}{2}$ cup cracker crumbs.
1 tablespoonful minced onion.

Salt, pepper, and powdered thyme, sage, and
savory.
2 tablespoonfuls flour.
1 tablespoonful sugar.
3 cupfuls water or stock.

Trim the kidneys of all fat, cords, and veins. Cut into small pieces and spread evenly over one side of the steak together with the crumbs, onion, and seasonings. Roll and tie with a cord. Brown the roll in fat, then remove and make a gravy by heating the flour in the fat and adding three cupfuls of stock or water and the sugar. Put the meat into the gravy and cook slowly until tender in a covered baking dish, a steamer, or a fireless cooker. If steamed or cooked in a fireless cooker, the roll should be browned in the oven before serving.

Veal or Beef Birds.

A popular dish known as veal or beef birds or by a variety of special names is made by taking small pieces of meat, each just large enough for an individual serving, and preparing them in the same way as the mock duck is prepared.

Sometimes variety is introduced by seasoning the stuffing with chopped olives or tomato. Many cooks prepare their "birds" by browning in a little fat, then adding a little water, covering closely and simmering until tender.

UTILIZING THE CHEAPER CUTS OF MEAT IN PALATABLE DISHES.

When the housekeeper attempts to reduce her meat bill by using the less expensive cuts, she commonly has two difficulties to contend with—toughness and lack of flavor. It has been shown how prolonged cooking softens the connective tissues of the meat. Pounding the meat and chopping it are also employed with tough cuts, as they help to break the muscle fibers. As for flavor, the natural flavor of meat even in the least desirable cuts may be developed by careful cooking, notably by browning the surface, and other flavors may be given by the addition of vegetables and seasoning with condiments of various kinds.

Methods of preparing inexpensive meat dishes will be discussed and practical directions for them will be given in the following sections. As often happens, two or three methods may be illustrated by the same dish, but the attempt has been made to group the recipes according to their most salient feature.

PROLONGED COOKING AT LOW HEAT.

Meat may be cooked in water in a number of ways without being allowed to reach the boiling point. With the ordinary kitchen range this is accomplished by cooking on the cooler part of the stove rather than on the hottest part, directly over the fire. Experience with a gas stove, particularly if it has a small burner known as a "simmerer," usually enables the cook to maintain temperatures which are high enough to sterilize the meat if it has become accidentally contaminated in any way and to make it tender without hardening the fibers. The double boiler would seem to be a neglected utensil for this purpose. Its contents can easily be kept up to a temperature of 200° F., and nothing will burn. Another method is by means of the fireless cooker. In this a high temperature can be maintained for a long time without the application of fresh heat. Still another method is by means of a closely covered baking dish. Earthenware dishes of this kind suitable for serving foods as well as for cooking are known as casseroles. For cooking purposes a baking dish covered with a plate or a bean jar covered with a saucer may be substituted. The Aladdin oven has long been popular for the purpose of preserving temperatures which are near the boiling point and yet do not reach it. It is a thoroughly insulated oven which may be heated either by a kerosene lamp or a gas jet.

In this connection directions are given for using some of the toughest and least promising pieces of meat.

Stewed Shin of Beef.

4 pounds of shin of beef.

1 medium-sized onion.

1 whole clove and a small bay leaf.

1 sprig of parsley.

1½ tablespoonfuls of flour.

1 small slice of carrot.

½ tablespoonful of salt.

½ teaspoonful of pepper.

2 quarts of boiling water.

1½ tablespoonfuls of butter or savory drippings.

Have the butcher cut the bone in several pieces. Put all the ingredients but the flour and butter into a stewpan and bring to a boil. Set the pan where the liquid will just simmer for six hours, or after boiling for five or ten minutes, put all into the fireless cooker for eight or nine hours. With the butter, flour, and one-half cupful of the clear soup from which the fat has been removed, make a brown sauce (see p. 28); to this add the meat and the marrow removed from the bone. Heat and serve. The remainder of the liquid in which the meat has been cooked may be used for soup.

Boiled Beef with Horse-radish Sauce.

Plain boiled beef may also be served with horse-radish sauce, for which a recipe is given on page 27, and makes a palatable dish. A little chopped parsley sprinkled over the meat when served is considered an improvement by many persons. For the sake of variety the meat may be browned like pot roast before serving.

Scotch Broth.

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| 3 pounds mutton. | 2 tablespoonfuls of minced celery. |
| 2 tablespoonfuls of pearl barley. | 2 tablespoonfuls of salt. |
| 2 tablespoonfuls of minced onion. | 1 teaspoonful of pepper. |
| 2 tablespoonfuls of minced turnip. | 1 tablespoonful of minced parsley. |
| 2 tablespoonfuls of minced carrot. | 3 quarts cold water. |

Remove the bones and all the fat from the mutton, cut the meat into small pieces and put it into a stewpan with the water, chopped vegetables, barley, and all the seasoning excepting the parsley. It will be found convenient to tie the bones in a piece of thin white cloth before adding them to the other ingredients. Bring the stew to a boil, quickly skim it and allow it to simmer for three hours, thicken with the flour, and add the chopped parsley.

Stuffed Heart.

Wash the heart thoroughly inside and out, stuff with the following mixture, and sew up the opening: One cup broken bread dipped in fat and browned in the oven, 1 chopped onion, and salt and pepper to taste.

Cover the heart with water and simmer until tender or boil ten minutes and set in the fireless cooker for six or eight hours. Remove from the water about one-half hour before serving. Dredge with flour, pepper, and salt, or sprinkle with crumbs and bake until brown.

Braised Beef, Pot Roast, and Beef à la Mode.

The above names are given to dishes made from the less tender cuts of meat. They vary little either in composition or method of preparation. In all cases the meat is browned on the outside to increase the flavor and then cooked in a small amount of water in a closely covered kettle or other receptacle until tender. The flavor of the dish is secured by browning the meat and by the addition of the seasoning vegetables. Many recipes suggest that the vegetables be removed before serving and the liquid be thickened. As the vegetables are usually extremely well-seasoned by means of the browned fat and the extracts of the meat, it seems unfortunate not to serve them.

Of course, the kind, quality, and shape of the meat all play their part in the matter. Extra time is needed for meats with a good deal of sinew and tough fibers such as the tough steaks, shank cuts, etc.; and naturally a fillet of beef, or a steak from a prime cut, will take less time than a thick piece from the shin. Such dishes require more time and perhaps more skill in their preparation and may involve more expense for fuel than the more costly cuts, which like chops or tender steaks may be quickly cooked, but to the epicure, as well as to the average man, they are palatable when rightly prepared.

Bean-Pot Roast.

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| 3 pounds mutton (shoulder), or | 1 cup potatoes cut into small pieces. |
| 3 pounds round, or chuck steak. | ¼ cup sliced onion. |
| 1 cup carrots cut into small pieces. | |

Cover the meat with boiling water. Place the cover on the bean pot and let the meat cook in a moderate oven for two hours; then add the vegetables cut in half-inch cubes, with 2 teaspoonfuls salt; cook until the vegetables are tender, which will require about one hour; then serve, pouring a sauce over the meat, made from 1 cup of the liquid in which the meat was cooked, thickened with 2 tablespoonfuls of flour.

Hungarian Goulash.

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| 2 pounds top round of beef. | 1 onion. |
| A little flour. | 2 bay leaves. |
| 2 ounces salt pork. | 6 whole cloves. |
| 2 cups tomatoes. | 6 peppercorns. |
| 1 stalk celery. | 1 blade mace. |

Cut the beef into 2-inch pieces and sprinkle with flour; fry the salt pork until light brown; add the beef and cook slowly for about thirty-five minutes, stirring occasionally. Cover with water and simmer about two hours; season with salt and pepper or paprika.

From the vegetables and spices a sauce is made as follows: Cook in sufficient water to cover for twenty minutes; then rub through a sieve, and add to some of the stock in which the meat was cooked. Thicken with flour, using 2 tablespoonfuls (moistened with cold water) to each cup of liquid, and season with salt and paprika.

Serve the meat on a platter with the sauce poured over it. Potatoes, carrots, and green peppers cooked until tender, and cut into small pieces or narrow strips, are usually sprinkled over the dish when served, and noodles may be arranged in a border upon the platter.

Goulash is a Hungarian dish which has come to be a favorite in the United States.

CASSEROLE COOKERY.

A casserole is a heavy earthenware dish with a cover. A substitute for it can easily be improvised by using any heavy earthenware dish with a heavy plate for the cover. A casserole presentable enough in appearance to be put on the table serves the double purpose of baking and serving dish.

A suitable cut of beef or veal, and it may well be one of the cheaper cuts, as the long, slow cooking insures tenderness, may be cooked in a casserole.

Poultry and other meats besides beef or veal can be cooked in this manner. Chicken cooked in a casserole, which is a favorite and expensive dish in good hotels and restaurants, may be easily prepared in the home, and casserole cookery is to be recommended for a tough chicken.

The heat must be moderate and the cooking must occupy a long time. Hurried cooking in a casserole is out of the question. If care is taken in this particular, and suitable seasonings are used, few who know anything of cooking should go astray.

Chopped meat also may be cooked in a casserole and this utensil is particularly useful for the purpose, because the food is served in the same dish in which it is cooked and may easily be kept hot, a point which is important with chopped meats, which usually cool rapidly.

Casserole Roast.

3 or 4 pounds of round or rump of beef.

A slice of salt pork.

A few peppercorns.

One-fourth each of a carrot, a turnip, an onion, and a head of celery cut into small pieces.

Try out the pork. Brown the meat on both sides in the fat. Put in a casserole with the vegetables around it, add 2 cupfuls of water or stock. Cover and cook in a hot oven three hours, basting occasionally. A sauce or gravy can be made with water, flour, and some of the juice left in the casserole.

Casserole or Italian Hash.

Boil one-fourth pound of macaroni, drain and put into a buttered casserole, add a little butter and grated cheese. Push the macaroni to the sides of the dish and fill the center with chopped cooked meat seasoned to suit the taste of the family. A little sausage gives a good flavor to this dish. Place in the oven until hot throughout and serve.

A very good modification of this is made by using raw instead of cooked meat. For this one-half pound of round steak is sufficient for a family of six. This should be cut into small pieces, browned, and cooked until tender in water with the onions and other seasonings. An hour before the cooking is complete, add one-half can of tomatoes. Before serving, the meat may be mixed with the sauce, and the whole is poured over the macaroni.

MEAT COOKED WITH VINEGAR.

Dishes of similar sort as regards cooking, but in which vinegar is used to give flavor as well as to soften the meat and make it tender, are the following:

Sour Beef.

Take a piece of beef from the rump or the lower round, cover with vinegar or with a half-and-half mixture of vinegar and water, add sliced onion, bay leaves, and a few mixed whole spices and salt. Allow to stand a week in winter or three or four days in summer; turn once a day and keep covered. When ready to cook, brown the meat in fat, using an enameled iron pan, strain the liquid over it and cook until tender; thicken the gravy with flour or ginger snaps (which may be broken up first), strain it, and pour over the sliced meat. Some cooks add cream.

Sour Beefsteak.

Round steak may be cooked in water in which there is a little vinegar, or if the time is sufficient, it may be soaked for a few hours in vinegar and water and then cooked in a casserole or in some similar way.

POUNDED MEAT.

Pounding meat before cooking is an old-fashioned method of making it tender, but while it has the advantage of breaking down the tough tissues it has the disadvantage of being likely to drive out the juices and with them the flavor. A very good way of escaping this difficulty is pounding flour into the meat; this catches and retains the juices. Below are given the recipes for two palatable dishes in which this is done:

Farmer Stew.

Pound flour into both sides of a round steak, using as much as the meat will take up. This may be done with a meat pounder or with the edge of a heavy plate. Fry in drippings, butter, or other fat in a Scotch bowl, or if more convenient in an ordinary iron kettle or a frying pan; then add water enough to cover it. Cover the dish very tightly so that the steam can not escape and allow the meat to simmer for two hours or until it is tender. One advantage of this dish is that ordinarily it is ready to serve when the meat is done as the gravy is already thickened. However, if a large amount of fat is used in the frying, the gravy may not be thick enough and must be blended with flour.

Spanish Beefsteak.

Take a piece of round steak weighing 2 pounds and about an inch thick; pound until thin, season with salt and Cayenne pepper, cover with a layer of bacon or salt pork, cut into thin slices, roll and tie with a cord. Pour around it half a cupful of milk and half a cupful of water. Place in a covered baking dish and cook two hours, basting occasionally.

CHOPPED MEAT.

Chopping meat is one of the principal methods of making tough and expensive meat tender, i. e., dividing it finely and thus cutting the connective tissue into small bits. Such meats have another advantage in that they may be cooked quickly and economically.

In broiling chopped meat the fact should be kept in mind that there is no reason why it should not be cooked like the best and most expensive tenderloin. The only reason that ever existed for difference in treatment was the toughness of the connective tissue, and this feature has been overcome by the chopping. The ideal to be reached in broiling steak is to sear the surface very quickly, so that the juices which contain the greater part of the flavoring of the meat shall be kept in, and then to allow the heat to penetrate to the inside until the whole mass is cooked to the taste of the family. To pass the point where the meat ceases to be puffy and juicy and becomes flat and hard is very undesirable, as the palatability is then lost. Exactly the same ideal should be kept in mind in broiling chopped meat. If this were always done, hard, compact, tasteless balls or cakes of meat would be served less often. To begin with, the broiler should be even more carefully greased than for a whole steak. This makes it possible to form the balls or cakes of chopped meat with very little pressure without running the risk of having them pulled to pieces by adhering to the wires of the broiler. They should be heated on both sides even more quickly than the steak, because the chopping has provided more ways of escape for the juice, and these openings should be sealed as soon as possible. The interior should be cooked to the taste of the family just as the steak is.

In regard to broiling it may incidentally be noted that housekeepers often make themselves unnecessary work when broiling under gas by allowing the juice from steaks or meat balls to drop into the large pan under the rack. A smaller pan set in the larger one may be made to catch all the juice and fat and is much easier to wash. It serves also to economize the gravy.

Chopped raw meat of almost any kind can be very quickly made into a savory dish by cooking it with water or with water and milk for a short time, then thickening with butter and flour, and adding different seasonings as relished, either pepper and salt alone, or onion juice, celery, or tomato. Such a dish may be made to "go further" by serving it on toast or with a border of rice or in some similar combination.

Tough Portions of Porterhouse Steak.

Before speaking of the cooking of the cuts that lack tenderness throughout, it may be well to refer to the fact that the flank end of the porterhouse is to be classed with the toughest of cuts and with those which, when cooked alone, are with difficulty made tender even by long heating. Mock duck, which is commonly made out of flank steak, can be rendered tender enough to be palatable only by long steaming or cooking in water (see p. 18) and yet people quite generally broil this part of the steak with the tenderloin and expect it to be eaten. The fact is that to broil this part of the porterhouse steak is not good management. It is much more profitable to put it into the soup kettle or to make it into a stew. In families where most of the members are away during the day the latter is a good plan, for the end of a steak makes a good stew for two or three people. This may be seasoned with vegetables left from dinner, or two or three olives cut up in gravy will give a very good flavor; or a few drops of some one of the bottled meat sauces, if the flavor is relished, or a little Chili sauce may be added to the stew. But if the tough end of a porterhouse is needed with the rest, a good plan is to put it through a meat grinder, make it into balls, and broil it with the tender portions. Each member of the family can then be served with a piece of the tenderloin and a meat ball. If the chopped meat is seasoned with a little onion juice, grated lemon rind, or chopped parsley, a good flavor is imparted to the gravy.

Hamburg Steak.

This name is commonly given to inexpensive cuts of beef chopped, seasoned a little, shaped into small balls or into one large thin cake, and quickly broiled in the way that a tender steak would be. Owing to the quick cooking much of the natural flavor of the meat is developed and retained. The fact should be kept in mind that Hamburg steak must be made from fresh, well-ground meat. It is much safer to chop the meat at home, as chopped meat spoils very quickly. Much depends, too, upon browning it sufficiently to bring out the flavors. Many cooks think that Hamburg steak is improved if the meat is mixed with milk before it is cooked.

In some parts of the country, and particularly in some of the Southern States, two kinds of beef are on sale. One is imported from other parts of the country and is of

higher price. The other, known locally as "native beef," is sometimes lacking in flavor and in fat and is usually tougher. Southern native beef such as is raised in Florida is almost invariably, however, of extremely good flavor, due presumably to the feed or other conditions under which it is raised. By chopping such meat and cooking it as Hamburg steak, a dish almost as palatable as the best cuts of the more expensive beef may be obtained. In such cases, however, it is desirable because of the low percentage of fat to add suet or butter to the meat. The reason for this is that in the cooking the water of the juice when unprotected by fat evaporates too quickly and leaves the meat dry. This may be prevented by adding egg as well as fat, for the albumen of the egg hardens quickly and tends to keep in the juices. The proportion should be 1 egg to $1\frac{1}{2}$ pounds of meat.

Savory Rolls.

Savory rolls in great variety are made out of chopped meat either with or without egg. The variety is secured by the flavoring materials used and by the sauces with which the baked rolls are served. A few recipes will be given below. While these definite directions are given it should be remembered that a few general principles borne in mind make recipes unnecessary and make it possible to utilize whatever may happen to be on hand. Appetizing rolls are made with beef and pork mixed. The proportion varies from two parts of beef and one of pork to two of pork and one of beef. The rolls are always improved by laying thin slices of salt pork or bacon over them, which keep the surface moistened with fat during the roasting. These slices should be scored on the edge, so that they will not curl up in cooking. The necessity for the salt pork is greater when the chopped meat is chiefly beef than when it is largely pork or veal. Bread crumbs or bread moistened in water can always be added, as it helps to make the dish go farther. When onions, green peppers, or other vegetables are used, they should always be thoroughly cooked in fat before being put in the roll, for usually they do not cook sufficiently in the length of time it takes to cook the meat. Sausage makes a good addition to the roll, but it is usually cheaper to use unseasoned pork meat with the addition of a little sage.

Cannelon of Beef.

This dish is prepared by making chopped beef into a roll and baking it wrapped in a buttered paper, a method designed to keep in the steam and so insure a moist, tender dish. The paper must be removed before serving. The roll should be basted occasionally with butter and water or drippings and water. In preparing the roll an egg may be added for each pound and a half of meat, and chopped parsley, onion juice, lemon peel, or finely chopped green peppers make good seasoning. A thickened gravy may be made from the drippings, the liquid used being either water or tomato juice (see p. 27).

Strips of pork laid on the roll may be substituted for the buttered paper and basting.

Filipino Beef.

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| 1 pound round beef. | 1 egg. |
| $\frac{1}{2}$ pound lean fresh pork. | 2 cups of stewed tomatoes. |
| 1 small onion. | 2 slices of bacon. |
| 1 green pepper. | 2 tablespoonfuls of butter. |
| 1 teaspoonful of salt. | 4 tablespoonfuls of flour. |
| 1 cup of soft stale bread crumbs. | |

Remove the seeds from the pepper and put it through the meat grinder with the meats and the onion. Add crumbs, egg, and salt. Make into a roll, place in a shallow baking dish, pour the strained tomatoes around it, put the bacon on top, and bake forty minutes, basting with the tomatoes. Thicken the gravy with the flour cooked in the butter. A little seasoning such as a bit of bay leaf, a clove, and a small piece of onion improves the tomato sauce. As the pepper and onion are not likely to be cooked as soon as the meat, it is well to fry them in a little fat before adding to the other ingredients.

This dish will serve 6 to 8 people. When the meat is 20 cents a pound and every other item is valued at usual town market prices, the dish costs about 50 cents. If the meat costs only 10 cents per pound and vegetables from the garden are used the initial cost of the dish will be small. Since no vegetable except potatoes or rice need be served with this dish, it may be said to answer the purpose of both meat and vegetable.

Mock Rabbit.

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| $\frac{1}{2}$ pound round steak, and | 3 slices of bread moistened with water. |
| 1 pound sausage; | 1 egg. |
| or | 1 onion. |
| $\frac{1}{2}$ pound round steak, and | $\frac{1}{2}$ pound salt pork. |
| $\frac{1}{2}$ pound sausage meat. | Pepper and salt. |

Chop the meat. Chop the onion and cook (but do not brown) it in the fat tried out of a small portion of the pork. Add the bread and cook a few minutes. When this is cool, mix all the ingredients and form into a long round roll. The surface can easily be made smooth if the hand is wet with cold water. Lay the remaining pork cut in thin slices on top and bake forty minutes in a hot oven. The sausage may be omitted if desired and other seasoning used.

Veal Loaf.

3 pounds veal.
1 pound salt pork.
6 soda crackers rolled fine.

3 eggs well beaten.
 $\frac{1}{4}$ teaspoonful pepper.
 $\frac{1}{2}$ teaspoonful salt.

Chop the meat mixed with the other ingredients, shape, and bake three hours, basting occasionally with pork fat. Use one-fourth cut of fat for this purpose. If the roll is pierced occasionally the fat will penetrate more effectually. Veal loaf may also be cooked in bread pans. Some persons cook the veal before chopping.

DEVELOPING AND IMPROVING FLAVOR OF MEAT.

The typical meat flavors are very palatable to most persons, even when they are constantly tasted, and consequently the better cuts of meat in which they are well developed can be cooked and served without attention being paid especially to flavor. Careful cooking aids in developing the natural flavor of some of the cheaper cuts, and such a result is to be sought wherever it is possible. Browning also brings out flavors agreeable to most palates. Aside from these two ways of increasing the flavor of the meat itself there are countless ways of adding flavor to otherwise rather tasteless meats. The flavors may be added in preparing the meat for cooking, as in various seasoned dishes already described, or they may be supplied to cooked meat in the form of sauces.

RETAINING NATURAL FLAVOR.

As has already been pointed out, it is extremely difficult to retain the flavor-giving extractives in a piece of meat so tough as to require prolonged cooking. It is sometimes partially accomplished by first searing the exterior of the meat and thus preventing the escape of the juices. Another device, illustrated by the following recipe, is to let them escape into the gravy which is served with the meat itself. A similar principle is applied when roasts are basted with their own juice.

Round Steak on Biscuits.

Cut round steak into pieces about one-half inch square, cover with water and cook it at a temperature just below the boiling point until it is tender, or boil for five minutes, and while still hot put into the fireless cooker and leave it for five hours. Thicken the gravy with flour mixed with water, allowing 2 level tablespoonfuls to a cup of water. Pour the meat and gravy over split baking-powder biscuits so baked that they have a large amount of crust.

FLAVOR OF BROWNE MEAT OR FAT.

Next to the unchanged flavor of the meat itself comes the flavor which is secured by browning the meat with fat. The outside slices of roast meat have this browned flavor in marked degree. Except in the case of roasts, browning for flavor is usually accomplished by heating the meat in a frying pan in fat which has been tried out of pork or in suet or butter. Care should be taken that the fat is not scorched. The chief reason for the bad opinion in which fried food is held by many is that it almost always means eating burned fat. When fat is heated too high it splits up into fatty acids and glycerin, and from the glycerin is formed a substance (acrolein) which has a very irritating effect upon the mucous membrane. All will recall that the fumes of scorched fat make the eyes water. It is not surprising that such a substance, if taken into the stomach, should cause digestive disturbance. Fat in itself is a very valuable food, and the objection to fried foods because they may be fat seems illogical. If they supply burned fat there is a good reason for suspicion. Many house-keepers cook bacon in the oven on a wire broiler over a pan and believe it more wholesome than fried bacon. The reason, of course, is that thus cooked in the oven there is less chance for the bacon becoming impregnated with burned fat. Where fried salt pork is much used good cooks know that it must not be cooked over a very hot fire, even if they have never heard of the chemistry of burned fat. The recipe for bean-pot roast (p. 20) and other similar recipes may be varied by browning the meat or part of it before covering with water. This results in keeping some of the natural flavoring within the meat itself and allowing less to go into the gravy. The flavor of veal can be very greatly improved in this way.

The following old-fashioned dishes made with pork owe their savoriness chiefly to the flavor of browned fat or meat:

Salt Pork with Milk Gravy.

Cut salt or cured pork into thin slices. If very salt, cover with hot water and allow it to stand for ten minutes. Score the rind of the slices and fry slowly until they are a golden brown. Make a milk gravy by heating flour in the fat that has been tried out, allowing 2 tablespoonfuls of fat and 2 tablespoonfuls of flour to each cup of milk. This is a good way to use skim milk, which is as rich in protein as whole milk. The pork and milk gravy served with boiled or baked potatoes makes a cheap and simple meal, but one that most people like very much. Bacon is often used in place of salt pork in making this dish.

Fried Salt Pork with Salt Codfish or "Salt-fish Dinner."

$\frac{1}{2}$ pound salt pork.

1 pound codfish.

2 cups of milk (skim milk will do).

4 tablespoonfuls flour.

A speck of salt.

Cut the codfish into strips, soak in lukewarm water and then cook in water until tender but do not allow the water to come to the boiling point except for a very short time as prolonged boiling may make it tough. Cut the pork into one-fourth inch slices and cut several gashes in each piece. Fry very slowly until golden brown, and remove, pouring off the fat. Out of 4 tablespoonfuls of the fat, the flour, and the milk make a white sauce. Dish up the codfish with pieces of pork around it and serve with boiled potatoes and beets. Some persons serve the pork, and the fat from it, in a gravy boat so it can be added as relished.

FLAVORING VEGETABLES, HERBS, SPICES, ETC.

Many flavorings are used in meat dishes, some of which are familiar to all cooks—onions, carrots, turnips, and garlic being perhaps the most widely known. Butter, too, may be regarded as one of the most common seasonings, and of course makes the dish richer. Meat extract is also used for flavoring many meat dishes and other foods, as are also, though less commonly, similar extracts made from clams or other "sea food." The following list includes these with various others, a number of which it is convenient to keep always on hand: Onions, carrots, green peppers, parsnips, turnips, tomatoes, fresh, canned or dried; celery tops and parsley, either fresh or dried; sage, savory, thyme, sweet marjoram, bay leaf, garlic, lemon rind, vinegar, capers, pickles, olives, currant jelly, curry powder, cloves, pepper corns, celery seed, meat extract, Chili sauce, pepper sauce, or some similar hot or sharp sauce, and some kind of good commercial meat sauce. Some hints regarding the use of such flavorings follow:

Flavor of fried vegetables.—Most of the stews, soups, braised meats, and pot roasts are very much improved if the flavoring vegetables which they contain, such as carrots, turnips, onions, celery, or green peppers, are fried in a little fat before being cooked with the meat. This need not complicate the preparation of the meat or increase the number of utensils used, for the meat itself is usually seared over in fat, and the vegetables can be cooked in the same fat before the browning of the meat.

Onion juice.—Cookbooks usually say that onion juice should be extracted by cutting an onion in two and rubbing the cut surface against a grater. Considering how hard it is to wash a grater, this method has its drawbacks. Small amounts of juice may be obtained in the following simpler way: Peel the onion and extract a few drops of juice by pressing one side with the dull edge of a knife.

Green peppers.—The flavor of green peppers gives an acceptable variety. The seed should always be removed. The peppers should be chopped and added to chopped meat or other meat dishes. Meat mixed with bread crumbs may be baked in the pepper shells and the stuffed peppers served as a separate dish.

Parsley.—It is easy to raise parsley by growing it in a pot in the kitchen window and thus to have it always on hand fresh, or the leaves may be kept for a long time if sealed up in a fruit jar and stored in a cool place. Parsley, mint, and celery tops may all be dried, rubbed into fine bits, and kept in air-tight jars. Recipes usually say to chop fresh parsley with a sharp knife on a board. But a board is a hard thing to wash and a plate serves the purpose quite as well.

Bay leaf.—Bay leaf is one of the best and at the same time one of the most-abused flavors. In small quantities it gives a very pleasant flavor to soups and gravies, but in large quantities it gives a rank resin-like taste. Remember that half of a bay leaf is the allowance for 3 quarts of soup stock. This will indicate how small a quantity should be used for the portion of gravy usually served at a meal. With this precaution in mind, bay leaf may be recommended as a flavoring for many sauces, particularly tomato sauce.

A kitchen bouquet.—A "bouquet" such as is often referred to in recipes may be made as follows: A sprig each of parsley, savory, and thyme, one small leaf of sage, and a bay leaf. This will flavor 1 gallon of soup when cooked in it for an hour and should not remain in it longer.

Horse-radish.—Horse-radish, like mustard, is more often served with meat than used to flavor it during cooking. A very palatable sauce, especially good with boiled beef, is made by adding grated horse-radish and a little vinegar to a little whipped cream, or as follows: Thicken milk with cracker crumbs by heating them together in a double boiler, using 3 tablespoonfuls of cracker crumbs to $1\frac{1}{2}$ cups of milk. Add one-third of a cup of grated horse-radish, 3 tablespoonfuls of butter, and $\frac{1}{2}$ teaspoonful of salt; or thicken with butter and flour some of the water in which the meat was boiled, add a generous quantity (1 or 2 tablespoonfuls) of grated horse-radish, boil a short time, and serve. This recipe is the most usual in German homes where the sauce is a favorite.

Acid flavoring.—Vinegar, lemon juice, and sour jelly, like currant, are often used to flavor the thick gravies which are a part of meat stew or which are served with it. Vinegar is an old-fashioned relish which was often added to bacon or salt pork and greens, pork and beans, corned beef and cabbage, and similar dishes. These flavors combine well with that of brown flour, but not with onions or other vegetables of strong flavor. The idea that vinegar used in small quantities is unwholesome seems to be without foundation.

Pickles.—Chopped pickles are sometimes added to the gravy served with boiled mutton. They are cheaper than capers and serve somewhat the same purpose. Chopped pickles are also very commonly used in sauces for fish and in many others to give a distinctive flavor.

Olives.—Chopped olives also make a welcome variety in meat sauce, and are not expensive if they are bought in bulk. They will not spoil if a little olive oil is poured on the top of the liquor in which they are kept. This liquor should always completely cover them.

Chili sauce, commercial meat sauces, etc.—Recipes often may be varied by the addition of a little Chili sauce, tomato catsup, or a commercial meat sauce. These may be called emergency flavors and used when it is not convenient to prepare other kinds of gravies.

Sausage.—A little sausage or chopped ham may be used in chopped beef.

Curry powder.—This mixture of spices which apparently originated in India, but which is now a common commercial product everywhere, is a favorite flavoring for veal, lamb, or poultry. The precaution mentioned in connection with bay leaves, however, should be observed. A small amount gives a good flavor. It is usually used to season the thick sauces with which meats are served or in which they are allowed to simmer. While the term "curry" is usually employed to describe a particular mixture of spices made up for the trade, it has another meaning. The words "curry" or "curried" are sometimes used to describe highly seasoned dishes of meat, eggs, or vegetables prepared by methods that have come from India or other parts of the East.

India Curry.

$1\frac{1}{2}$ pounds veal.

$\frac{1}{2}$ cup of butter or drippings.

2 onions or less.

$\frac{1}{2}$ tablespoonful curry or less.

Brown meat either without fat or with very little and cut into small pieces.

Fry the onions in the butter, remove them, add the meat and curry powder. Cover the meat with boiling water and cook until tender. Serve with a border of rice. This dish is so savory that it can be made to go a long way by serving with a large amount of rice. The two onions and one-half tablespoonful of curry powder are the largest amount to be used. Many persons prefer less of each.

In preparing the rice for this dish perhaps no better method can be given than that in an earlier bulletin of this series:—

"Wash 1 cupful of rice in several waters, rubbing the grains between the hands to remove all the dirt. Put the washed rice in a stewpan with $2\frac{1}{2}$ cupfuls of water and 1 teaspoonful of salt. Cover and place where the water will boil. Cook for twenty minutes, being careful not to let it burn. At the end of this time put the stewpan on a tripod or ring and cover the rice with a fold of cheese cloth. Let it continue to cook in this manner an hour, then turn into a hot vegetable dish. The rice will be tender, dry and sweet, and each grain will separate. During the whole process of cooking the rice must not be stirred. If a tablespoonful of butter is cut up and scattered over the rice when it has cooked twenty minutes the dish will be very much improved."

The butter is not necessary when the rice is served with India curry but may be included in dishes where less fat is used.

Curry of Veal.

2 tablespoonfuls butter or drippings.

$1\frac{1}{2}$ pounds veal.

$\frac{1}{2}$ onion, chopped.

1 pint milk.

1 tablespoonful flour.

1 teaspoonful curry powder.

Salt and pepper.

Fry the onions in the butter or drippings, remove, and fry the veal until it is brown. Transfer the meat to the double boiler, cover with milk and cook until the meat is tender. Add the curry powder a short time before the meat is done and thicken the milk with flour before serving.

SAUCES.

The art of preparing savory gravies and sauces is more important in connection with the serving of the cheaper meats than in connection with the cooking of the more expensive.

There are a few general principles underlying the making of all sauces or gravies, whether the liquid used is water, milk, stock, tomato juice, or some combination of these. For ordinary gravy 2 level tablespoonfuls of flour or $1\frac{1}{2}$ tablespoonfuls of cornstarch or arrowroot is sufficient to thicken a cupful of liquid. This is true excepting when, as in the recipe on page 16, the flour is browned. In this case about one-half tablespoonful more should be allowed, for browned flour does not thicken so well as unbrowned. The fat used may be butter or the drippings from the meat, the allowance being 2 tablespoonfuls to a cup of liquid.

The easiest way to mix the ingredients is to heat the fat, add the flour, and cook until the mixture ceases to bubble, and then to add the liquid. This is a quick method and by using it there is little danger of getting a lumpy gravy. Many persons, however, think it is not a wholesome method and prefer the old-fashioned one of thickening the gravy by means of flour mixed with a little cold water. The latter method is of course not practicable for brown gravies.

Considering the large amount of discussion about the digestibility of fried food and of gravies made by heating flour in fat, a few words on the subject at this point may not be out of order. It is difficult to see how heating the fat before adding the flour can be unwholesome, unless the cook is unskillful enough to heat the fat so high that it begins to scorch. Overheated fat, as has already been pointed out, contains an acrid irritating substance called "acrolein," which may be readily considered to be unwholesome. It is without doubt the production of this body by overheating which has given fried food its bad name. Several ways of varying the flavor of gravies and sauces were suggested in the preceding section. One other should be especially mentioned here.

The flavor of browned flour.—The good flavor of browned flour is often overlooked. If flour is cooked in fat until it is a dark brown color a distinctive and very agreeable flavor is obtained. This flavor combines very well with that of currant jelly, and a little jelly added to a brown gravy is a great improvement. The flavor of this should not be combined with that of onions or other highly flavored vegetables. A recipe for a dish which is made with brown sauce follows.

Mock Venison.

Cut cold mutton into thin slices and heat in a brown sauce made according to the following proportions:

2 tablespoonfuls butter.	1 tablespoonful red-currant jelly.
2 tablespoonfuls flour.	1 cupful water or stock.
1 tablespoonful of bottled meat sauce (whichever is preferred.)	

Brown the flour in the butter, add the water or stock slowly, and keep stirring. Then add the jelly and meat sauce and let the mixture boil up well.

SUMMARY.

The nutritive value of meat, the relative digestibility of different kinds and cuts cooked in various ways, the losses sustained in different methods of cooking, and related questions which have to do with the use of meat as food, have been studied as a part of the nutrition investigations of the States Relations Service. Many investigators have contributed to the enterprise and special methods have been followed. In the study of some of the problems the respiration calorimeter has been used and results have been obtained important from a scientific as well as from a practical standpoint.

Studies of the food habits of peoples living in the temperate and warmer regions of the world, where animal and vegetable foods are both found in abundance and where there is opportunity for choice, show that, while vegetable foods—cereals, succulent vegetables, and fruits—compose the greater part of the bulk of the diet, animal foods—dairy products, eggs, meat, and fish—

almost invariably enter into the bill of fare. For many reasons it seems fair to conclude, with the majority of the physiologists, that this widespread habit is the result of experience and that it has its foundation in bodily needs. From the earliest times, in fact, man has used animal foods, and his whole body structure is adapted to the use of such articles of diet. Though some, for various reasons, do not favor the eating of flesh, the consensus of opinion among physiologists who have given special attention to the subject is that flesh foods are a wholesome and normal part of the diet.

Of course it is possible to overeat of these foods, but so it is to overeat of such foods as butter, or olive oil, for example; so in meat eating, as in other food habits, moderation is desirable. This is particularly the case for those who live sedentary lives involving little muscular work. Such people naturally select and seem to need less meat and other foods than those who lead out-of-door lives and do hard manual labor. The man of sedentary life, if he has the food habits of the average American family, would ordinarily take a moderate portion of meat or fish—a chop or a cutlet or a slice of roast beef—once a day, or a somewhat larger quantity divided between two or all three meals. Such a quantity would weigh from 3 to 5 ounces, an amount certainly not large. The heartier man, who leads a vigorous life in the open air, would naturally relish more meat just as he would want more bread, butter, and other foods than the man with little active work. The fact that some persons eat more meat than the circumstances of their lives demand should not be taken as an argument against meat eating in general.

According to statistics compiled in the States Relations Service, meat furnishes about 16 per cent of the total food consumed in the ordinary American family, about 30 per cent of the protein desirable in the average diet, and 60 per cent of the energy-producing fats. It is possible to obtain all of the necessary protein and energy from other materials, but for many reasons it is doubtful if such a proceeding would be either desirable or agreeable for the average person. Exactly how much meat should be eaten is a difficult matter to determine: probably if one meat dish is served a day, and other materials supplying protein, such as milk, eggs, beans, or similar foods, are also used, there is little danger of getting too much meat or too little protein. It is of course possible to eat meat dishes less frequently, or as noted above, to omit meat from the diet altogether, if one so desires and the diet is so arranged that it remains well balanced.

Meat is in general one of the most digestible of food materials. Recent experiments indicate that all kinds are thoroughly digested, less expensive cuts as well as the more costly. The higher priced cuts contain more of the so-called extractives or extractives of more pleasing quality, and it is these substances which not only give the meat its agreeable flavor, but also actually stimulate the digestive processes. They have, however, little if any nutritive value, and for persons with normal digestion the less expensive cuts, even if less rich in extractives, cooked and flavored in an appetizing way, may certainly be used to replace the more costly cuts.

Meat is undeniably one of the more expensive items in the food bill of the ordinary family, and for this reason it is important that it be bought and used to the best possible advantage. In rural communities cooperative slaughter-houses and storage houses are often useful not only in reducing the cost of meat, but in making fresh meat available in summer. If the size of her family or her storage facilities warrant, the housekeeper may find it advantageous to buy the whole carcass of a small animal, such as a pig or a lamb, or a large section of beef, thus securing better prices. Carefully following the market and taking advantage of any special opportunity that may offer also helps to reduce the expense for meat for the family in town.

It is also important to reduce waste by using as much as possible of the bone, fat, and trimmings, not usually served with the meat itself. If nothing better can be done with them, the bones and trimmings can almost always be profitably used in the soup kettle and the fat can be saved for cooking, thus saving the more expensive butter and lard. The bits of meat not served with the main dish or remaining after the first serving can be seasoned and recooked in many palatable ways, or can be combined with vegetables, pie crust, or other materials, and thus the meat flavor may be extended over a large quantity of less expensive food with such combinations. Moreover, smaller quantities of meat can often be bought than would be necessary were the meat served alone.

Different kinds and cuts of meat vary considerably in price. Sometimes the cheaper cuts contain a larger proportion of refuse than the more expensive, and the apparent cost is less than the actual cost of the edible portion. Aside from this the advantage of the more expensive cuts lies in tenderness and flavor rather than in nutritive value. Tenderness depends on the character of the muscle fibers and connective tissues of which the meat is composed. Flavor depends partly on the fat present in the tissues, but mainly on nitrogenous bodies known as extractives, which are usually more abundant or of more agreeable flavor in the more tender parts of the animal. The heat of cooking dissolves the connective tissues of tough meat and in a measure makes it more tender, but heat above the boiling point or even a little lower tends to change the texture of muscle fibers. Hence tough meats must be carefully cooked in low heat long applied in order to soften the connective tissue without unduly changing the fibers. Cooking, especially in water, presents a further danger, namely, the escape into the water of the nutritious material in the meat. In cases where the liquid in which the meat is cooked is to be used, as in soups and some stews, this is of less importance or it may even be an advantage, but where the meat only is to be used the fact must always be taken into consideration. Not only is the amount of nutritive material in the meat lessened, but the extractives are lost and with them more or less of the flavor the meat originally possessed. To lessen the chances of loss, cooks frequently sear the exterior of the meat either in hot fat or in boiling water before beginning the long cooking, or tough meat may be pounded or chopped to break down the tissues to a certain extent, and thus permit shorter cooking. Besides using such devices to retain and develop the natural flavor of the meat, other flavors may be added to supplement them. These may be put into the meat before cooking or may be added later in the form of relish or sauce.

Vegetables of distinctive flavor such as onions, carrots, or celery; savory herbs such as parsley, sage, bay leaf, or thyme; and materials such as vinegar, pickles, or currant jelly; spices such as pepper, cloves, or "curry" mixtures; and sharp or highly seasoned meat sauces are all types of flavoring materials which are useful for such purposes and which may be used in a great variety of ways.

In fact the number of "tasty" dishes which a good cook can make out of the cheaper cuts of meat or meat "left over" is almost endless. Undoubtedly more time and skill are required in their preparation than in the simple cooking of the more expensive cuts, just as more time and skill are required for careful, intelligent marketing than for haphazard ordering; but the real superiority of a good cook lies not so much in the preparation of expensive or fancy dishes as in the attractive preparation of inexpensive dishes for every day and in the skillful combination of flavors.

Some housekeepers seem to have a prejudice against economizing in such ways as those here suggested; but, if the comfort of the family does not suffer and the meals are kept as varied and appetizing as when they cost more, little ground for the feeling exists. Surely it is not beneath the dignity of any family to avoid useless expenditure, no matter how generous its income, and the intelligent housekeeper should take as much pride in setting a good table at a low price as the manufacturer does in lessening the cost of production in his factory.

ORGANIZATION OF THE UNITED STATES DEPARTMENT OF AGRICULTURE.

April 23, 1924.

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